

**SOUTH**

**DAKOTA**



**BLUE DOG LAKE STATE FISH HATCHERY  
2005 Annual Production Report**

**South Dakota  
Department of  
Game, Fish and Parks**  
Wildlife Division  
Joe Foss Building  
Pierre, South Dakota 57501-3182

**Progress Report  
No. 06-04**

**BLUE DOG LAKE STATE FISH HATCHERY**  
**2005 Annual Production Report**

**January 1 – December 31, 2005**

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***Annual Report***

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## **PREFACE**

This document presents a summary of fish production and related activities during the production year 2005 (January 1 – December 31) at Blue Dog Lake State Fish Hatchery, rural Waubay, South Dakota. Copies of this report and references to the data can be made by obtaining permission from the authors or the Director of the Division of Wildlife, South Dakota Department of Game, Fish and Parks, 523 E. Capitol, Pierre, South Dakota 57501-3182.

The authors thank the following individuals from the South Dakota Department of Game, Fish and Parks who assisted with data collection and management or who provided comments for this report; Gene Galinet, Dan Jost, Mark Ermer, Todd St. Sauver, and Dennis Unkenholz. The collection of data for portions of this report was partially supported by Federal Aid in Sport Fish Restoration Project F-41-D-14.

## **EXECUTIVE SUMMARY**

During 2005 a total of 99.3 million eggs were incubated, 47.6 million fry were hatched, 2.1 million fingerlings were produced, and 2,650 catchable fish were produced at BDH. In addition, personnel from BDH assisted with fish production related operations in natural rearing ponds (278,040 fingerlings) and trap and transfer of fishes among waters (22,712 fish) throughout South Dakota. Specifically, fish production at or associated with BDH yielded the following: 2,650 rainbow trout, 1,708 muskellunge, 181,135 largemouth bass, 87,260 smallmouth bass, 47,600,000 walleye fry, and 1,877,600 walleye fingerlings. BDH personnel provided tours to roughly 400 visitors through the IE center at the hatchery complex and were involved in educational clinics at water festivals and outreach programs that reached 580 children in grades one through four. Finally, BDH personnel managed and maintained the aquarium exhibit at the South Dakota State Fair that was visited by thousands of South Dakota residents and visitors of South Dakota.

Overall, BDH staff worked a total of 12,984 hours. Roughly 21 percent of staff hours were expended on fish culture and another 25 percent of staff hours were expended on maintenance of equipment, hatchery complex buildings, and grounds. In total, BDH expenditures in 2005 were \$380,015 of which \$107,339 (28.2%) was spent on fish production activities (e.g., culture at BDH, natural rearing pond culture, stocking, and regional assistance) and another \$66,422 (17.5%) was expended on equipment, building and ground maintenance at the hatchery complex. Fish production expenditures associated with BDH and other SDGFP fisheries related work was \$522,585. A total of \$354,012 was expended on walleye production in 2005, which comprised roughly 68 percent of total fish production expenses.

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# **BLUE DOG LAKE STATE FISH HATCHERY**

## **Annual Report**

### **Introduction**

Blue Dog Lake State Fish Hatchery (BDH) is located in eastern South Dakota approximately 1.5 miles northwest of the city limits of Waubay. BDH was completed in the fall of 1982 and the facility immediately took over the state's warm- (e.g. black bass, bluegill, crappie) and coolwater (e.g., walleye, muskellunge) fish production.

The hatchery is situated on the northwest shoreline of Blue Dog Lake, where there is abundant high-quality ground and lake water (Figure 1). These waters provide the hatchery with a variety of water temperature supplies for many different uses for both indoor (intensive) and outdoor (extensive) rearing of fish. Inside the hatchery are 700 incubation jars, 20 incubators, and 30 rearing tanks. The building contains a visitor center and aquaria, informative displays and a conference room. Outdoors there are eight raceways and 36 rearing ponds, totaling over 53 surface acres of water. Thirteen fish species have been produced at BDH since its inception. However, walleye (*Sander vitreus*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), and muskellunge (*Esox masquinongy*) comprised the largest portion of fish rearing activities at BDH during 2005. The objective of this document is to summarize all fish production and related activities that occurred at BDH during 2005.

### **Hatchery Fish Production**

#### *Inter-Hatchery Transfers*

BDH received fish and eggs from other states and hatcheries to be released in South Dakota public waters. A complete summary of inter-hatchery transactions completed at BDH is presented in Table 1.

#### *Rainbow Trout and Brown Trout*

Requests for rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) from BDH are relatively small due to the limited habitat available in eastern South Dakota. Therefore, coldwater fish species (e.g., trout) are typically reared at the state's coldwater hatcheries in western South Dakota (McNenny State Fish Hatchery, MCH; Cleghorn State Fish Hatchery, CLH) and then transferred to BDH for a short time prior to stocking.

On June 02, MCH transferred to BDH a total of 2,650 catchable (8 –10 inch total length, TL) rainbow trout (2.3 fish/lb.). Subsequently, 1,300 rainbow trout were transported immediately and stocked into Hunter's Granite Quarry (Grant County) on June 23 700 additional rainbow trout were stocked into the Quarry. Gary Creek (Deuel County) which traditionally is stocked with brown trout, was stocked with catchable rainbow trout this year. On June 08, 650 rainbow trout were stocked into Gary Creek.

Figure 1. Blue Dog Lake State Fish Hatchery.

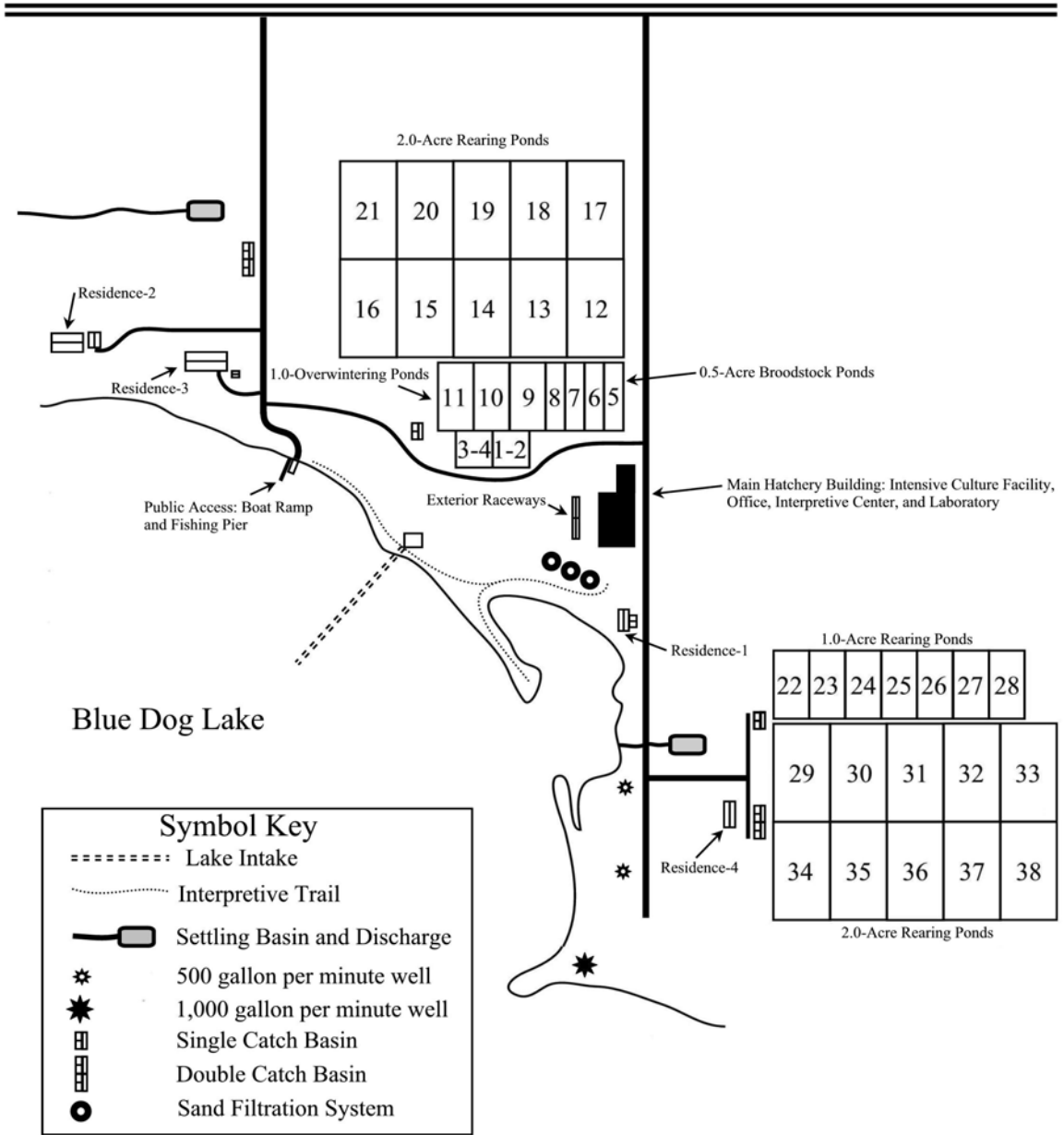


Table 1. Inter-hatchery transfer record of wild fish and fish eggs to (*Received*) or from (Provided) Blue Dog Lake State Fish Hatchery (January 1 – December 31, 2005).

	Size	Quantity	Source or Destination
<i>Received</i>			
Rainbow trout	catchable	2,650	McNenny State Fish Hatchery, Spearfish, SD
Muskellunge	advanced fingerling	5,625	Spirit Lake State Fish Hatchery, Spirit Lake, IA
Tiger Muskellunge	advanced fingerling	500	Pennsylvania Fish and Boat Commission
Walleye	fry	1,110,000	Gavins Point National Fish Hatchery, Yankton, SD
Walleye	eggs	804,000	Minnesota Department of Natural Resources
<i>Provided</i>			
Walleye	fingerling	46,900	Minnesota Department of Natural Resources

Expenditure: A total expenditure of \$13,363.00 (\$5.04 for each fish) was incurred for trout production at BDH (Table 2).

### *Muskellunge*

Muskellunge are not native to South Dakota waters; however, fisheries managers have requested muskellunge for introductory and maintenance stocking. Although BDH has the ability to incubate and rear muskellunge there are currently no muskellunge populations in South Dakota with the ability to provide sufficient eggs for production purposes. Therefore, BDH has obtained muskellunge donated from other state hatcheries, grown the muskellunge in extensive rearing ponds during summer, overwintered the muskellunge, and subsequently stocked South Dakota waters during spring.

In 2004, the Iowa Department of Natural Resources (IADNR) provided muskellunge to the SDGFP, which were transferred from Spirit Lake State Fish Hatchery (SLFH; Spirit Lake, IA) to BDH by SDGFP personnel. A total of 4,070 4-inch TL fingerlings were stocked into a 0.5-acre pond at BDH on July 07, 2004 (Broughton et al. 2004). Subsequently, a total of 1,708 (213.5 lbs.; 8.0 fish/lb.) overwintered muskellunge were harvested on March 31, 2005 for a return percent of 42.0. Total length of muskellunge more than doubled during the grow-out period at BDH from an average TL of 4.0 inches at stocking to an average harvest TL of 10.0 inches.

Muskellunge production at BDH during 2005/2006 will be similar to the 2004/2005 methods. On July 7, 2005, a total of 5,625 4.5-inch TL fingerlings were transferred from SLFH and stocked into a 0.5-acre rearing pond at BDH. Fingerling muskellunge were grown in the hatchery rearing ponds during summer 2005, are being overwintered, and will be harvested and stocked into Region IV waters during spring 2006. Muskellunge were sustained during the fall 2005 and spring 2006 “grow-out” period with roughly 800 lbs. of small and gravid (distended or full of eggs) fathead minnows *Pimephales promelas*, which were stocked into the muskellunge-rearing pond.

Expenditure: A total expenditure of \$12,297 (\$7.20 per fish) was incurred for muskellunge production at BDH from 2004-spring 2005 (Table 3). Expenditures from July-December 2005 were \$15,006.00. Total expenditure for each muskellunge produced will be determined after spring 2006 harvest (Table 4).

### *Walleye*

Walleye production at BDH during 2005 included the incubation of 99.3 million eggs, the hatching of 47.6 million fry, and the harvest of 1.87 million small fingerlings (Phase I fingerlings) from extensive rearing ponds.

Broodfish Collection, Egg Procurement and Spawning: A total of 99.3 million walleye eggs were collected from South Dakota waters and incubated at BDH during 2005. Spawning operations conducted in South Dakota by the SDGFP included the collection of adult walleye with 0.75 or 1.00 inch frame nets between April 6 and April 28, 2005 (Table 5). All walleye eggs incubated at BDH were harvested from South Dakota waters during 2005. Spawning locations in 2005 included Antelope Lake (Day County), Grand River (Lake Oahe), Hauge GPA (Day County), Hazeldon (Day County),

Lake Pelican (Coudington County) and Moreau River (Lake Oahe). (Table 6). To induce spawning, “green” females were kept in holding nets at Antelope Lake, Grand River and the Moreau River spawning stations for up to three days. If females had not spawned by the fourth day of holding the fish were released to the wild. Holding females resulted in 6,311,000 eggs (26.2%), 7,311,000 eggs (27.0%) and 5,591,000 eggs (24.3%) from Antelope Lake, Grand River and the Moreau River, respectively (Table 5).

**Fry Production:** Walleye eggs were received at BDH for a span of 23 days (April 7 – April 29). Upon arrival, eggs were processed as follows: 1) tempered to hatchery water temperature, 2) placed in incubation jars (2,000 mL/jar), and 3) given initial pickoff with a hand siphon if necessary. One day after arrival when the eggs had fully water-hardened, eggs were measured (egg diameter) using a six-inch Von-Bayer trough. Walleye eggs were subjected to daily, 15-minute flow through prophylactic treatments of formalin (1,667 mg/L) to prevent egg mortality due to fungal infestation (e.g., *Saprolegnia* spp.).

A total of 47,600,000 walleye fry were produced and an overall percent hatch of 48.0 percent was achieved (Table 6). Eggs collected from Antelope Lake, Grand River, Pelican Lake and Moreau River yielded hatch success rates of (65.1%), (48.2%), (67.6%) and (54.7%) respectively; however, Hauge and Hazeldon eggs demonstrated the lowest survival with hatch percentages of 0.0 and 0.0 percent, respectively.

Table 2. Expenditures associated with production of catchable rainbow trout and brown trout at Blue Dog Lake State Fish Hatchery (January 1 – December 31, 2005).

Item	Expenditure (\$)
Spawning	0.00
Effort <sup>1</sup>	3,611.00
Utilities	0.00
Chemicals and Supplies	0.00
Food and Feeding	0.00
Distribution <sup>2</sup>	2,559.00
Miscellaneous <sup>3</sup>	7,193.00
Total	13,363.00
Per 1,000	5,042.64
Per fish	5.04

<sup>1</sup> A total of 184 man-hours.

<sup>2</sup> Includes expenditures committed to South Dakota Fleet and Travel Management, Bureau of Administration, Pierre.

<sup>3</sup> Includes \$6,500 in production expenditures forwarded from McNenny State Fish Hatchery, Spearfish, South Dakota.

Table 3. Expenditures associated with production of muskellunge at Blue Dog Lake State Fish Hatchery (January 2004 – May 2005).

Item	Expenditure (\$)
Spawning	0.00
Effort <sup>1</sup>	4,928.00
Utilities	4,444.00
Chemicals and Supplies	0.00
Food and Feeding	630.00
Distribution <sup>2</sup>	2,295.00
Miscellaneous	937.00
Total	12,297.00
Per 1,000	---
Per fish	7.20

<sup>1</sup> A total of 437 man-hours.

<sup>2</sup> Includes expenditures committed to South Dakota Fleet and Travel Management, Bureau of Administration, Pierre.



Table 4. Expenditures associated with production of muskellunge at Blue Dog Lake State Fish Hatchery (July – December 2005).

Item	Expenditure (\$)
Spawning	0.00
Effort <sup>1</sup>	7,142.00
Utilities	4,209.00
Chemicals and Supplies	0.00
Food and Feeding	882.00
Distribution <sup>2</sup>	1,591.00
Miscellaneous	1,182.00
Total	15,006.00
Per 1,000 <sup>3</sup>	---
Per fish <sup>3</sup>	---
Per pound <sup>3</sup>	---

<sup>1</sup> A total of 349 man-hours.

<sup>2</sup> Includes expenditures committed to South Dakota Fleet and Travel Management, Bureau of Administration, Pierre.

<sup>3</sup> A total expenditure for each 1,000 muskellunge produced will be determined after spring harvest from the extensive rearing pond at BDH in production year 2006.

Table 5. Spawning information for operations conducted at South Dakota spawning stations (April 6 – April 28, 2005).

Location	Netting			Male Walleye		Female Walleye			
	Begin	End	Nets (n)	Captured	Spawnd	Captured	Held	Ripened	Spawnd
Antelope Lake		04-15	200	170	58	554	144	61	233
Grand River	04-06	04-28	386	7,776	1,445	1,067	477	136	504
Hauge <sup>i</sup>	04-04-12	04-18	120	---	---	---	0	0	---
Hazeldon		04-20	94	1748	280	588	0	0	202
Lake Pelican	04-14	04-16	183	483	186	321	0	0	141
Moreau River	04-06	04-28	299	4,991	633	816	309	74	304
	04-15								
Total	04-06	04-28	1,282	15,168	2,602	3,346	930	271	1,384

<sup>1</sup> The number of males and females captured and spawned was not available.

Table 6. Walleye egg procurement from South Dakota waters, and fry production at Blue Dog Lake State Fish Hatchery, 2005.

Location	Walleye		
	Eggs (N)	Fry (n)	Hatch Percent
<i>South Dakota</i>			
Antelope Lake	24,107,000	15,700,000	65.1
Grand River	27,093,000	13,050,000	48.2
Hauge	4,517,000	0	0.0
Hazeldon	10,513,000	0	0.0
Lake Pelican	9,251,000	6,250,000	67.6
Moreau River	22,967,000	12,600,000	54.7
Total	99,252,000	47,600,000	48.0

Fingerling Production: Extensive rearing ponds were stocked with walleye fry for a period of 11 days between May 6 and May 16. Pond temperatures at the time of stocking ranged from 48 to 56 °F. In total, twenty 2.0-acre and one 1.0-acre ponds were stocked with walleye fry (Table 7). The extensive rearing pond stocking schedule included: 1) 75,000 fry/acre in twenty 2.0-acre ponds, 2) a single 1.0-acre pond stocked with jar rack pick-off (hospital pond).

Ponds were filled with unfiltered lake water about 3-days prior to walleye stocking to inoculate the ponds with initial nutrients, phytoplankton, and zooplankton. In addition, an initial fertilization application was administered that included chopped alfalfa (250 lbs./acre) and yeast (25 lbs./acre). This initial application of chopped alfalfa was utilized to stimulate nitrogen and carbon fixing benthic bacterial populations and subsequent heterotrophic production. Ponds were also supplemented with chopped alfalfa (125 lbs./acre) administered at 10-day intervals throughout the remainder of the walleye grow-out season as an additional organic nitrogen and phosphorus source. Ponds were monitored for water quality (e.g., temperature, dissolved oxygen, and pH) with a YSI Model 6000 deployable environmental monitoring system (YSI Incorporated). In addition, weekly horizontal plankton tows and shoreline seining was conducted to monitor walleye growth and food availability, respectively .

Walleye fingerlings were harvested for a period of 8 days in June (June 14 – June 21) resulting in an average rearing duration of 37 days (Table 7). Overall, a total of 1,877,600 phase I walleye fingerlings were produced with a combined weight of 1,279 lbs. and an overall size of 1,468 fish/lb. The survival of walleye in extensive rearing ponds averaged 61.9 percent (range, 0 to 90.7 percent) excluding pond 9. Pond 9 was stocked with egg and fry pick-off from the walleye incubating jars; therefore, the number of walleye fry that hatched or that were directly stocked was unknown and the survival could not be determined. The overall walleye survival in 2005 was slightly lower than the 73.3 survival percent reported in 2003 (Broughton et al. 2004); however, the 2005 walleye survival percent was nearly 50 percent higher than the 12.7 and 17.7 survival percentages yielded in 2002 (Broughton et al. 2003) and 2001 (Broughton et al. 2002), respectively. Ideal rearing conditions for walleye apparently include water temperatures at the time of stocking near 55 °F, gradually warming post-stocking water temperatures, and the avoidance of drastic temperature fluctuations that can cause rapid fry mortality.

Expenditure: Total expenditures associated with walleye production at BDH during 2005 were \$334,881 (Table 8). Walleye fry and fingerling were produced at BDH at a cost of \$5.04 and \$50.39 for each 1,000 fish produced, respectively. Expenditures for each 1,000 phase I walleye produced was lower than 2004 (\$57.54 per 1,000).

Table 7. Rearing information (date stocked, Stock; date harvested, Harvest; number of days reared, Days), numbers (fry stocked, N; fingerlings harvested, n), percent return (Return, %), total weight (Weight, lbs.), and rate (Rate, fish/lb.) for walleye cultured in extensive rearing ponds at Blue Dog Lake State Fish Hatchery during 2005 (May 6 – June 21).

Pond <sup>1</sup>	Rearing			Stock N	Harvest			
	Stock	Harvest	Days		n	Return	Weight	Rate
9	---	06-15	---	---	19,200	---	16	1,200
12	05-16	06-21	36	150,000	107,300	71.5	88	1,220
13	05-16	06-20	35	150,000	105,000	70.0	95.5	1,100
14	05-10	06-16	37	150,000	75,600	50.4	70	1,080
15	05-08	06-15	38	150,000	113,100	75.4	65	1,740
16	05-06	06-14	39	150,000	90,300	60.2	61	1,480
17	05-16	06-21	36	150,000	108,000	72.0	72	1,500
18	05-16	06-20	35	150,000	125,200	83.5	107	1,170
19	05-10	06-16	37	150,000	102,500	68.3	84	1,220
20	05-08	06-15	38	150,000	136,000	90.7	68	2,000
21	05-06	06-14	39	150,000	109,700	73.2	59	1,860
29	05-06	06-14	39	150,000	81,900	54.6	42	1,950
30	05-08	06-15	38	150,000	111,800	74.5	43	2,600
31	05-10	06-20	41	150,000	95,200	63.5	40	2,380
32	05-14	06-17	31	150,000	0	0	0	-----
33	05-16	06-21	36	150,000	91,600	61.1	81	1,130
34	05-06	06-14	39	150,000	76,800	51.2	48	1,600
35	05-08	06-15	38	150,000	102,600	68.4	57	1,800
36	05-10	06-20	41	150,000	89,800	59.9	68	1,320
37	05-10	06-17	35	150,000	46,900	31.3	33.5	1,400
38	05-16	06-21	36	150,000	89,100	59.4	81	1,100
Total <sup>2</sup>	---	---	---	3,000,000	1,877,600	61.9	1,279.0	1,468

<sup>1</sup> One-acre surface area ponds included pond 9. All other ponds were 2.0-acres in surface area.

<sup>2</sup> Number stocked and harvest return excludes pond 9 because the number stocked was unknown.

Table 8. Expenditures associated with walleye fry and small fingerling (Phase I fingerling) production at Blue Dog Lake State Fish Hatchery (January 1 – December 31, 2005).

Item	Expenditure (\$)		
	Fry	Fingerling	Total
Spawning	88,755.00	---	48,360.00
Effort <sup>1</sup>	110,474.00	51,598.00	139,242.00
Utilities	7,891.00	10,522.00	19,443.00
Chemicals and Supplies	900.00	500.00	2,923.00
Food and Feeding	0.00	800.00	2,350.00
Distribution <sup>2</sup>	13,849.00	7,570.00	25,534.00
Miscellaneous <sup>3</sup>	18,381.00	23,638.00	33,450.00
Total	240,253	94,628.00	334,881.00
Per 1,000	5.04	50.39	---
Per fish	<0.01	0.05	---

<sup>1</sup> A total of 8,072 man-hours (fry production, 5,531 h; fingerling production, 2,451 h).

<sup>2</sup> Includes expenditures committed to South Dakota Fleet and Travel Management, Bureau of Administration, Pierre.

<sup>3</sup> Includes \$15,120.00 in costs associated with stocking rearing ponds with walleye fry.

### *Black Bass*

Black bass (largemouth bass and smallmouth bass) have been requested from BDH by fisheries managers for introductory, supplemental, and maintenance stocking programs throughout South Dakota. As a result, black bass have been reared each year since BDH began fish production in 1983. However, requests for each largemouth bass and smallmouth bass by fisheries managers often fluctuate from year-to-year. Thus, black bass adults have been collected from wild fish populations and maintained at BDH as broodstock. Typically, black bass are allowed to spawn naturally in the extensive rearing ponds (spawning pond) at BDH. Subsequently, the spawning ponds are drained and the black bass small fingerlings and broodstock are separated after which the small fingerlings are restocked into ponds (grow out ponds) until late fall (e.g., September).

Broodstock Maintenance: Black bass broodfish (average weight, 2.0 – 4.0 lbs.) were overwintered in two 1.0-acre ponds at the hatchery (Table 9). Overwintering ponds were drained in early spring and the black bass broodstock were held in 48 °F unfiltered well water until pond spawning conditions became favorable. The practice of delaying black bass spawning by holding broodfish on cool well water effectively decreased the potential for mortality induced by post-spawn temperature fluctuations in the rearing ponds. In addition, the delay of black bass spawning enables the use of 2.0-acre rearing ponds for each walleye and bass culture because walleye are typically harvested during late June prior to bass harvest from spawning ponds and transfer to grow-out ponds.

The black bass broodstock were introduced into the spawning ponds in late-May and after spawning was complete the bass spawning ponds were drained. To save time and possibly increase small fingerling numbers the spawning ponds were drained with both adults and small fingerlings simultaneously, which has been successful in previous years. The black bass broodstock were then transferred into 1.0-acre overwintering ponds and supplemented with fathead minnows at a rate of 2.5 lbs. for each pound of bass throughout summer (July – October) (Table 9).

Table 9. Black bass (largemouth bass and smallmouth bass) broodstock over wintering pond schedule at Blue Dog Lake State Fish Hatchery (Fall 2004 through Fall 2005).

Species	Pond		Fall 2004	Spring 2005		Fall 2005
	Number	Size (Acre)	Stock	Recovery (n)	Recovery (%)	Stock
Largemouth bass	10	1.0	343	318	92.7	
Smallmouth bass	11	1.0	148	143	96.6	139
						311
Total	---	---	491	461	93.9	450



Spawning: Largemouth bass broodfish were stocked into five 1.0-acre extensive rearing ponds (21-22 female and 22-23 male each) and a four 0.5-acre extensive rearing pond (12 female and 12 - 13 male; Table 10). All largemouth bass spawning ponds were stocked on May 27 and subsequently drained from June 28 to July 11. A total of 406,310 largemouth bass small fingerlings were harvested from spawning ponds. The overall yield of largemouth bass from spawning ponds based on numbers was 58,040 fingerlings per surface acre (2,621 fingerlings per female). Largemouth bass collected from spawning ponds ranged in size from 1,340 to 6,870 bass per pound. The total weight of largemouth bass harvested from spawning ponds was 148.6 lbs. with an average yield based on weight of 21.2 lbs./surface acre.

Similarly, smallmouth bass were stocked into two 1.0-acre extensive rearing ponds (27 male and 29 female each) and one 0.5-acre extensive rearing ponds (15 male and 16 female; Table 10). Smallmouth bass broodstock were introduced into the spawning ponds on May 10 and were drained from June 24 to June 27. A total of 242,340 smallmouth bass fingerlings were harvested from the spawning ponds. The overall yield of smallmouth bass from spawning ponds based on numbers was 96,940 fingerlings per surface acre (3,275 fingerlings per female). Smallmouth bass collected from spawning ponds ranged in size from 3,240 to 3,770 bass per pound. The total weight of smallmouth bass harvested from spawning ponds was 67.9 lbs. with an average yield based on weight of 27.2 lbs./surface acre.

Overall, black bass spawning in extensive rearing ponds produced 648,650 fingerlings (216.5 lbs.) that ranged in size from 1,340 to 6,870 bass per pound. The overall yield of black bass from spawning ponds was 68,280 bass per surface acre and 2,830 fingerlings per female bass broodfish.

Table 10. Rearing information (date stocked, Stock; date harvested, Harvest; number of days reared, Days), numbers (male broodfish stocked, Male; female broodfish stocked, Female; fingerlings harvested, n), total weight harvested (Weight, lbs.), size of fingerlings (Rate, fish/lb.), and yield (number of fingerlings per female, Per Female; number of fingerlings per surface acre, Per Acre) for black bass (largemouth bass and smallmouth bass) reared in 0.5 and 1.0-acre extensive ponds at Blue Dog Lake State Fish Hatchery (May 10 – July 11, 2005).

Pond <sup>1</sup>	Rearing			Male	Female	Harvest			Yield	
	Stock	Harvest	Days			n	Weight	Rate	Per Female	Per Acre
<i>Largemouth bass</i>										
5	05-27	07-07	41	Stock 12	12	40,600	10.0	4,060	3,383	81,200
6	05-27	07-06	40	13	12	11,500	2.3	5,000	958	23,000
7	05-27	07-05	39	13	12	24,500	6.3	3,890	1,885	49,000
8	05-27	06,28	32	13	12	96,180	14.0	6,870	8,015	192,360
24	05-27	07-05	39	22	21	59,570	21.9	2,720	2,837	59,570
25	05-27	07-06	40	22	21	45,780	21.8	2,100	2,180	45,780
26	05-27	07-07	41	22	21	34,760	22.0	1,580	1,655	34,760
27	05-27	07-08	42	23	22	28,680	21.4	1,340	1,304	28,680
28	05-27	07-11	45	23	22	64,740	28.9	2,240	2,943	64,740
Overall	---	---	---	163	155	406,310	148.6	2,735	2,621	58,040
<i>Smallmouth bass</i>										
3-4	05-10	06-24	45	15	16	65,770	20.3	3,240	4,110	131,540
22	05-10	06-24	45	27	29	88,970	23.6	3,770	3,068	88,970
23	05-10	06-27	48	27	29	87,600	24.0	3,650	3,020	87,600
Overall	---	---	---	69	74	242,340	67.9	3,570	3,275	96,940
Total	---	---	---	232	229	648,650	216.5	3,000	2,830	68,280

<sup>1</sup> Ponds of 0.5-acre surface area included 3-4, 5, 6, 7, and 8. All other ponds were 1.0-acres in surface area.

Fingerling Production: Black bass fingerlings were cultured during the grow-out season in ponds that had previously been drained for the harvest of walleye. Subsequently, black bass grow-out ponds were immediately filled with unfiltered lake water after draining and prior to black bass stocking. Black bass grow-out ponds were supplemented with chopped alfalfa (125 lb./acre) as a source of organic nitrogen and phosphorus initially upon refilling and with three to four additional applications during the grow-out season. Similar to walleye culture explained previously, the initial application of chopped alfalfa was utilized to stimulate nitrogen and carbon fixing benthic bacterial populations and subsequent heterotrophic production. In addition, unfiltered lake water was added continuously to all of the ponds to aid in aeration and the removal of harmful dissolved gasses (e.g., ammonia). Ponds were monitored for water quality (e.g., temperature, dissolved oxygen, and pH), with a YSI Model 6000 deployable environmental monitoring system (YSI Incorporated).

An estimated 406,310 fingerling largemouth bass were transferred from spawning ponds to eleven 2.0-acre extensive rearing ponds for the grow-out season (Table 11). The stocking rates of largemouth bass into grow-out ponds based on numbers was 18,470 (range, 7,945 – 48,090) fingerling bass per surface acre and 6.8 lbs. (range, 3.75 – 11.0) per surface acre based on weight. Largemouth bass were stocked into grow-out ponds from June 28 to July 11 and subsequently drained from August 29 to September 7. A total of 181,135 largemouth bass fingerlings were harvested from grow-out ponds with an overall return percent from stock to harvest of 44.6 (range, 20.0 – 79.6). The overall yield of largemouth bass from grow-out ponds based on numbers was 8,233 (range, 3,600 – 13,838) fingerlings per surface acre. Largemouth bass collected from grow-out ponds ranged in size from 80 to 300 bass per pound. The total weight of largemouth bass harvested from spawning ponds was 1,255 lbs. with an average yield based on weight of 57.0 lbs./surface acre.

An estimated 242,340 fingerling smallmouth bass were transferred from spawning ponds to three 2.0-acre extensive rearing ponds for the grow-out season (Table 11). The stocking rate of smallmouth bass into grow-out ponds based on numbers was 40,390 fingerling bass per surface acre and 11.3 lbs. per surface acre based on weight. Smallmouth bass were stocked into grow-out ponds on June 24 to June 27 and subsequently drained on August 17-18. A total of 82,670 smallmouth bass fingerlings were harvested from grow-out pond with an overall return percent from stock to harvest of 34.1. The overall yield of smallmouth bass from grow-out pond based on numbers was 13,778 fingerlings per surface acre. Smallmouth bass collected from grow-out pond were 242 bass per pound. The total weight of smallmouth bass harvested from grow-out ponds was 341.5 lbs. with an average yield based on weight of 56.9 lbs./surface acre.

The culture of black bass at BDH has been a successful program since BDH began fish production in 1983; however, two areas of concern are of special interest relating to bass culture at BDH. First, the culture of smallmouth bass at BDH depends on requests from fisheries managers. The anticipated smallmouth bass stocking requests beyond the 2005-production season at BDH are expected to

Table 11. Rearing information (date stocked, Stock; date harvested, Harvest; number of days reared, Days), Stocking information (number stocked, N; total weight stocked (Weight, lbs.), size stocked, (Rate, fish/lb.), Harvest information (fingerlings harvested, n), total weight harvested (Weight, lbs.), size of fingerlings (Rate, fish/lb.), percent return, (Return %) and yield (number of fingerlings, Number; weight of fingerlings, Weight; per surface acre) for black bass (largemouth bass and smallmouth bass) reared in 2.0-acre extensive ponds at Blue Dog Lake State Fish Hatchery (June 24 – September 7, 2005).

Pond	Rearing						Harvest				Yield	
	Stock	Harvest	Days	N	Weight	Rate	n	Weight	Rate	Return	Number	Weight
<i>Largemouth bass</i>												
12	07-11	08-30	50	30,920	13.8	2,240	11,570	89.0	130	37.4	5,785	44.5
13	07-08	08-29	52	28,680	21.4	1,340	15,600	104.0	150	54.4	7,800	52.0
19	07-11	08-30	50	31,580	14.1	2,240	20,670	159.0	130	65.5	10,335	79.5
20	07-07	08-29	53	34,760	22.0	1,580	27,675	184.5	150	79.6	13,838	92.25
31	07-05	08-29	55	36,000	8.6	4,186	7,200	80.0	90	20.0	3,600	40.0
32	07-05	08-30	56	28,830	10.6	2,720	15,990	123.0	130	55.7	7,995	61.5
33	07-06	09-07	63	15,890	7.5	2,119	10,000	125.0	80	62.9	5,000	62.5
35	06-28	08-29	62	96,180	14.0	6,870	13,950	46.5	300	14.5	6,975	23.25
36	07-05	08-30	56	30,740	11.3	2,720	19,380	114.0	170	63.0	9,690	57.0
37	07-06	09-07	63	32,130	15.3	2,100	19,550	115.0	170	60.8	9,775	57.5
38	07-07	09-07	62	40,600	10.0	4,060	19,550	115.0	170	48.2	9,775	57.5
Overall	---	---	---	406,310	148.6	2,734	181,135	1,255.0	144	44.6	8,233	57.0
<i>Smallmouth bass</i>												
29	06-24	08-17	53	73,110	20.7	3,532	18,300	122.0	150	25.0	9,150	61.0
30	06-27	08-18	51	87,600	24.0	3,650	36,960	112.0	330	42.2	18,480	56.0
34	06-24	08-17	53	81,630	23.2	3,518	27,410	107.5	255	33.6	13,705	53.75
Overall	---	---	---	242,340	67.9	3,569	82,670	341.5	242	34.1	13,778	56.9
Total	---	---	---	648,650	216.5	2,996	263,805	1,596.5	165	40.7	9,422	57.0

decline and a cost:benefit of maintaining broodstock at the hatchery should be developed. Secondly, fisheries managers have expressed concern regarding the success of stocking largemouth bass produced at BDH. Specifically, it is believed that largemouth bass of the size provided by BDH during the fall are insufficient to maintain an appropriate over-winter survival in the wild. Apparently, stocking programs in eastern South Dakota have generally failed using fingerling largemouth bass from BDH. Published literature suggests that over-winter survival of largemouth bass post-stocking generally depends on sufficient energy reserves; therefore, the larger the size of the fish stocked the better the chance for recruitment (e.g., Pine et al. 2000).

Expenditure: Of the total expenses incurred at BDH for largemouth bass production \$16,332 (17.8%) was spent on broodstock maintenance and \$75,221 (82.2%) on direct costs of fingerlings production (Table 12). Largemouth bass broodstock were maintained at BDH at a cost of \$51.35 for each fish . Including the cost of broodstock maintenance in the total expenditure for bass fingerling production resulted in spending a total of \$415.27 for each 1,000 fingerlings produced, or \$0.41 per fish.

Of the total expenses incurred at BDH for smallmouth bass production \$8,424.00 (23.2%) were spent on broodstock maintenance and 27,930 (76.8%) on direct costs of fingerlings production (Table 12). Smallmouth bass were maintained at BDH at a cost of \$58.90 for each fish . Including the cost of broodstock maintenance in the total expenditure for smallmouth bass fingerling production yielded a total cost of \$337.84 for each 1,000 fingerlings produced or \$0.34 per fish.

Total overall expenditures associated with black bass production at BDH during 2005 were \$127,907 (Table 12). Of the total expenses incurred at BDH for black bass production \$24,756 (19.4%) were spent on broodstock maintenance and \$103,151 (80.6%) on direct costs associated with fingerling bass production

Table 12. Expenditures associated with broodstock care and fingerling production of black bass at Blue Dog Lake State Fish Hatchery (January 1 – December 31, 2005).

Item	Expenditure (\$)		
	Broodfish	Fingerling	Total
<i>Largemouth bass</i>			
Spawning	0.00	0.00	0.00
Effort <sup>1</sup>	6,298.00	42,553.00	48,851.00
Utilities	7,891.00	11,574.00	19,465.00
Chemicals and Supplies	0.00	500.00	500.00
Food and Feeding	1,124.00	1,354.00	2,478.00
Distribution <sup>2</sup>	0.00	12,108.00	12,108.00
Miscellaneous	1,019.00	7,132.00	8,151.00
Overall	16,332.00	75,221.00	91,553.00
Per 1,000 <sup>3</sup>	---	415.27	---
Per fish <sup>3</sup>	51.35	0.41	---
<i>Smallmouth bass</i>			
Spawning	0.00	0.00	0.00
Effort <sup>4</sup>	3,356.00	18,756.00	22,112.00
Utilties	3,684.00	2,630.00	6,314.00
Chemicals and Supplies	0.00	119.00	119.00
Food and Feeding	854.00	106.00	960.00
Distribution <sup>2</sup>	0.00	3,222.00	3,222.00
Miscellaneous	530.00	3,097.00	3,627.00
Overall	8,424.00	27,930.00	36,354.00
Per 1,000 <sup>3</sup>	---	337.84	---
Per fish <sup>3</sup>	58.90	0.34	---
<hr/>			
Total	24,756.00	103,151.00	127,907.00
Per 1,000 <sup>3</sup>	---	391.01	---
Per fish <sup>3</sup>	53.70	0.39	---

<sup>1</sup> A total of 2,421 man-hours (broodfish care, 315 h; fingerling production, 2,106 h).

<sup>2</sup> Includes expenditures committed to South Dakota Fleet and Travel Management, Bureau of Administration, Pierre.

<sup>3</sup> Per 1,000 and per fish costs for fingerlings and total are estimated based on the fingerlings harvested.

<sup>4</sup> A total of 1,105 man-hours (broodfish care, 165 h; fingerling production, 940 h).

### *Chemical Use and Disease Treatment*

Pathogens, parasites, and aquatic nuisance species (ANS) are a serious issue for fish hatchery management. The occurrence and/or spread of any diseases caused by a pathogen, parasite or ANS at BDH could result in devastating effects on fish production. Therefore, procedures that promote healthy fish production and the avoidance of transferring harmful pathogens, parasites and ANS are perpetually implemented at BDH. Generally, BDH adheres to the SDGFP health management policy to prevent the introduction or spread of aquatic animal pathogens into areas where they are not known to occur in the State of South Dakota. In cases where fishes are identified as abnormal the infected fishes are removed from the general population immediately upon identification of symptoms and the underlying cause is quickly identified so appropriate actions can be initiated (Piper et al. 1982).

The occurrence of unwanted pathogens, parasites, and ANS are kept to a minimum at the hatchery by a consistent prophylactic chemical treatment program. For example, the majority of fish reared at the hatchery or handled by the hatchery crew receive some type of prophylactic treatment such as baths or flow-through treatments. All bath treatments are administered with forced air to prevent oxygen depletion while the fresh water flow is absent. In addition, fungal formation during egg incubation of walleye, northern pike and Chinook salmon eggs is avoided by the administration of daily treatments of an approved chemical concentration (e.g., 1,667-mg/L formalin or 500-mg/L hydrogen peroxide). These 15-minute, flow-through treatments are delivered with a peristaltic pump under supervision by hatchery staff.

The continued disinfecting of equipment (e.g., dip nets, rearing tanks, hauling tanks, etc.) is important to avoid transfer of pathogens, parasites or ANS among waters. During the rearing season used equipment (e.g., dip nets, brushes, etc.) are submerged in benzylkonium chloride (1,200 mg/L). Hauling tanks are typically disinfected with HTH (calcium hypochlorite) at a concentration of 100 mg/L.

### **Information and Education**

The promotion of educational opportunities for the general public is demonstrated throughout the year at BDH. First, the hatchery complex contains an information and education (IE) center that houses 17 fish mounts, fish facts (e.g., anatomy, age, growth, movement, temperature preferences, etc.), lake dynamic illustrations (e.g., annual cycle, hydrological cycle, oxygen cycle), freshwater ecology information (e.g., aquatic food web), and the walleye fry production process. The IE center also contains a 700-gallon aquarium that provides the public with opportunity to view live fish species that are present throughout South Dakota. If desired, the IE center provides the opportunity for visitors to view a slide show that demonstrates common practices at BDH. The slide shows at BDH are designed for various audiences (adult show, 18-minute duration; children show, 5-minute duration). Outside, the hatchery maintains hundreds of rainbow trout and brown trout in a raceway that provides the opportunity for visitors to feed fish. Furthermore, a trail is maintained that provides the public access to a wetland and Blue

Dog Lake. The hatchery complex's IE center is open to the public during regular office hours (8:00 AM to 4:30 PM, Monday – Friday). During summer months (May – September) a seasonal intern operates the IE center at BDH, which is open during weekend hours (8:00 AM to 4:30 PM, Saturday – Sunday). In 2005, the IE center at BDH was visited by roughly 400 visitors. Visitors at BDH were provided guided tours of the hatchery complex and the opportunity to view hatchery processes when events were in progress.

Educational opportunities for the public often extend beyond the BDH boundaries. BDH personnel are frequently present at festivals, Fairs, and other educational events associated with water. Finally, the South Dakota State Fair aquarium displays were maintained and managed by personnel from BDH.

### **Water Quality Monitoring**

Water quality is extremely important to the successful production of fish at BDH. The hatchery utilizes two water sources, well water and lake water. The major differences between well water and lake water are temperature and turbidity. Well water is typically 48 to 50 °F and lake water can reach temperatures in excess of 80 °F. In addition, filtered lake water is more turbid than well water, which often interferes with visual observations of the fish. All water used in the hatchery is passed through an aeration tower which results in oxygen saturation levels of approximately 93.0 percent and the removal of undesired gases (e.g., nitrogen). Monitoring of BDH water is conducted through annual analysis at the South Dakota Department of Health laboratories, Pierre. Generally, BDH water maintains a pH of 7.4 to 8.0, unionized ammonia levels less than 0.06 mg/L, total iron of 0.2 mg/L, and manganese concentration of 0.61 mg/L. During egg incubation and intensive fish rearing an iron and manganese filtration system reduces the concentration of the dissolved solids to 0.01 and 0.03 mg/L, respectively.

### **Natural Rearing Pond Production**

Natural rearing ponds (NRP) in eastern South Dakota have been utilized for fish production purposes. Rearing fish in NRP can be beneficial because the process utilizes the natural fertility of surface water, requires minimal or no maintenance during the growing season, and because natural waters on state or federal land is available for fish production. Fish species that have been produced in NRP include largemouth bass, walleye and yellow perch. During 2005 a total of 278,040 walleye



Table 13. Number of walleye harvested (Number), total weight harvested (Weight, lbs.), size of fish harvested (Rate, number/lb.) and total expenditure of harvest from natural rearing ponds during 2005 (January 1 – December 31). Walleye fingerling harvest occurred in ponds stocked (Stock, x 1,000) with fry.

Lake	Species		Stock	Harvest			Expenditure (\$)
	Common Name	Type		Number	Weight	Rate	
Region III							
South Brush	Walleye	Juvenile		24	8	3.0	371.23
Overall	Walleye	Juvenile		24	8	3.0	371.23
Region IV							
Augustana	Walleye	Juvenile	---	200	40	5.0	730.19
Berg	Walleye	Fingerling	300	---	---	---	133.52
Bom Homme	Walleye	Fingerling	---	900	20	45.0	306.79
East Stink	Walleye	Fingerling	2,500	250,270	7,821	32.0	9,197.65
Keintz	Walleye	Fingerling	300	---	---	---	88.68
Krause 40	Walleye	Fingerling	200	744	93	8.0	890.30
Larson	Walleye	Fingerling	350	1,750	350	5.0	1,069.62
Lindroth	Walleye	Fingerling	---	160	16	10.0	299.24
Rau	Walleye	Fingerling	600	---	---	---	110.29
Schock	Walleye	Fingerling	500	---	---	---	89.64
Skeide	Walleye	Fingerling	300	---	---	---	88.68
Stianson	Walleye	Fingerling	---	300	12	25.0	742.78
Trautner	Walleye	Fingerling	350	13,368	1,114	12.0	2,054.62
West Stink	Walleye	Juvenile	---	10,324	1,948	5.3	2,957.79
Overall	Walleye	Fingerling	5,400	278,016	11,414	---	18,759.79
Combined							
Total	Walleye	Fingerling		267,492	9,426	---	15,071.81
	Walleye	Juvenile		10,548	1,996	---	4,059.21

were harvested from NRP in eastern South Dakota (Table 13). The total weight of walleye harvested from NRP was 11,422 lbs. Fingerling walleye that were stocked as fry during spring 2005 comprised 96.2 percent of walleye harvested from NRP.

Expenditure: A total of \$19,131.02 was directly spent on NRP related activities including harvest and stocking (Table 13). When overhead expenses (e.g., equipment maintenance, hatchery expenses, etc.) were included the total investment in the natural rearing pond program was \$30,062.02 (Table 14). A total of \$108.12 was spent for each 1,000 walleye harvested. The overall expenditure for each pound of fish harvested from natural rearing ponds was \$2.63. Expenditures do not include the cost of stocked fry.

### **Trap and Transfer Operations**

Trap and transfer operations were undertaken on several lakes in 2005. These operations serve several purposes such as removing fish from possible summerkill or winterkill situations, alleviating overpopulation, and providing a source of valuable fish to be restocked in new locations. Fish species that were transferred among waters during 2005 included: black crappie, bluegill, brown trout, channel catfish, gizzard shad, largemouth bass, northern pike, walleye, and yellow perch (Table 15).

A total of 22,712 fish of various species were trapped from public waters in South Dakota and again stocked in other South Dakota waters. Based on numbers yellow perch were the most transferred fish (9,733 transferred) followed by northern pike (3,604 transferred), bluegill (3,334 transferred), channel catfish (2,577 transferred), largemouth bass (998 transferred), and black crappie (1,624 transferred). Other fish species trap and transferred included walleye (310 transferred), brown trout (200 transferred) and gizzard shad (332 transferred). Bluegill and yellow perch were transferred among South Dakota waters in three of the four regions.

Expenditure: The total expenditure for trap and transfer operations in South Dakota during 2005 was \$23,878.89 (Table 16). When comparing among management regions, Region III expended \$12,928.05, which was 54.0% of the total trap and transfer operation expenses in South Dakota during 2005. The greatest total expense was associated with the trap and transfer of yellow perch (\$6,642.63), which comprised over 27 percent of trap and transfer expenditures during 2005. Based on the cost for each 1,000 fish transferred gizzard shad (\$4,614.33 per 1,000) were the most expensive followed by brown trout (\$2,038.54), largemouth bass (\$1,908.69), and northern pike (\$1,498.30).

Table 14. Expenditures associated with production of walleye in natural rearing ponds in eastern South Dakota (January 1 – December 31, 2005).

Item	Expenditure (\$)
<i>Walleye</i>	
Harvest expenses	19,131.02
Hatchery costs	5,048.00
Equipment and Maintenance	5,883.00
Overall	30,062.02
Per 1,000	108.12
Per fish	0.11
Per pound	2.63

Table 15. Number (Number), total weight (Weight, lbs.), size (Rate, number/lb.) and total expenditure associated with trap and transfer operations during 2005 (January 1 – December 31).

Species		Transfer			Expenditure (\$)
Common Name	Type	Number	Weight	Rate	
Region I					
Brown trout	Adult	200	33	6.0	407.69
Channel catfish	Adult	200	200	1.0	567.02
Gizzard shad	Adult	332	664	0.5	1,531.96
Largemouth bass	Adult	275	138	2.0	524.89
Walleye	Juvenile	310	54	5.7	262.50
Yellow perch	Adult	1,543	308	5.0	1,060.62
All species	---	2,860	1,397	---	4,354.68
Region II					
Black crappie	Adult	336	130	2.6	515.00
Northern Pike	Adult	7	35	0.2	17.48
Bluegill	Adult	85	24	3.9	299.10
Largemouth bass	Juvenile	723	258	2.8	2,070.47
Yellow perch	Adult	900	113	8.0	2,305.36
All species	---	2,051	560	---	5,207.41
Region III					
Black crappie	Adult	1,288	243	5.3	688.03
Bluegill	Adult	249	50	5.0	171.27
Channel catfish	Adult	2,377	5,441	0.4	3,409.70
Northern pike	Adult	3,597	10,791	0.3	5,382.40
Yellow perch	Adult	7,290	3,644	2.0	3,276.65
All species	---	14,801	20,169	---	12,928.05
Region IV					
Bluegill	Adult	3,000	120	25.0	1,388.75
All species	---	3,000	120	---	1,388.75
Statewide					
Black crappie	Adult	1,624	373	4.4	1,203.03
Brown Trout	Adult	200	33	6.0	407.69
Bluegill	Adult	3,334	194	17.2	1,859.12
Channel catfish	Adult	2,577	5,641	0.5	3,976.72
Gizzard shad	Adult	332	664	0.5	1,531.96
Largemouth bass	Adult	275	138	2.0	524.89
Northern pike	Adult	3,604	10,826	0.3	5,399.88
Walleye	Juvenile	310	54	5.7	262.50
Largemouth bass	Juvenile	723	258	2.8	2,070.47
Yellow perch	Adult	9,733	4,065	2.4	6,642.63
Overall	---			---	
All species	---	22,712	22,246	---	23,878.89

Table 16. Expenditures including total cost (Total), cost per 1,000 fish (Per 1,000), cost per fish (Per Fish), and the cost per pound of fish (Per Pound) associated with trap and transfer operations in South Dakota during 2005 (January 1 – December 31).

Species		Expenditure (\$)			
Common Name	Type	Total	Per 1,000	Per Fish	Per Pound
Black crappie	Adult	1,203.03	740.78	0.74	3.25
Brown trout	Adult	407.69	2,038.54	2.04	
Bluegill	Adult	1,859.12	557.62	0.56	9.58
Channel catfish	Adult	3,976.72	1,605.46	1.61	0.70
Gizzard shad	Adult	1,531.96	4,614.33	4.61	2.31
Largemouth bass	Adult	524.89	1,908.69	1.91	3.80
Largemouth bass	Juvenile	2,070.47	2,863.72	2.86	8.03
Northern pike	Adult	5,399.88	1,498.30	1.50	0.50
Walleye	Juvenile	262.50	846.77	0.85	4.86
Yellow perch	Adult	6,642.63	682.49	0.68	1.63
Overall	---				
All species	---	23,878.89			

## Summary

During 2005 a total of 99.2 million eggs were incubated, 47.6 million fry were hatched, 1.9 million fingerlings were produced, and 2,650 catchable fish were produced at BDH. In addition, personnel from BDH assisted with fish production related operations in natural rearing ponds (278,040 fingerlings) and trap and transfer of fishes among waters (22,712 fish) throughout South Dakota. Specifically, fish production at or associated with BDH yielded the following: 2,650 rainbow trout, 1,708 muskellunge, 181,135 largemouth bass, 82,670 smallmouth bass, 47,600,000 walleye fry, and 1,877,600 walleye fingerlings.

Overall, BDH staff worked a total of 12,984 hours (Table 17). Roughly 40 percent of staff hours (5,243 hours) at BDH during 2005 were expended on fish culture at the hatchery complex, fish production in natural rearing ponds, stocking fish, and net construction or regional assistance (Figure 2). Similarly, approximately 25 percent of staff hours (3,230 hours) were expended on maintenance of equipment, hatchery complex buildings, and grounds. BDH personnel provided the public 325 tours through the IE center at the hatchery complex and were involved in educational clinics at water festivals and outreach programs that reached 580 children in grades one through four. Finally, BDH personnel managed and maintained the aquarium exhibit at the South Dakota State Fair that was visited by thousands of South Dakota residents and visitors of South Dakota.

In total, BDH expenditures in 2005 were \$380,015 of which \$107,339 (28.2%) was spent on fish production activities (e.g., culture at BDH, natural rearing pond culture, stocking, and regional assistance) and another \$66,422 (17.5%) was expended on equipment, building and ground maintenance at the hatchery complex (Table 17). Fish production expenditures associated with BDH and other SDGFP fisheries related work were \$522,585 (Table 18). A total of \$354,012 was expended on walleye production in 2005, which comprised roughly 68 percent of total fish production expenses.

Figure 2. Allocation percentage for major activities at Blue Dog Lake State Fish Hatchery during 2005 (January 1 – December 31).

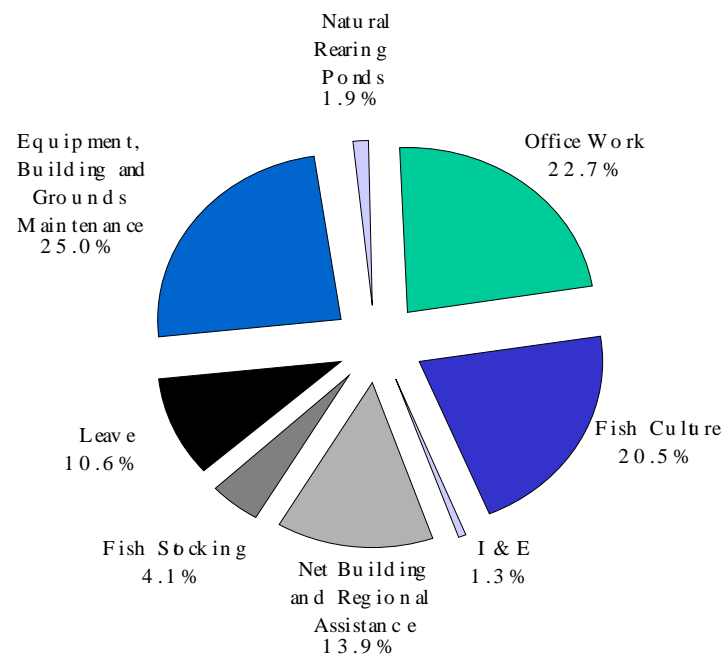


Table 17. Effort (man-hours) and cost distribution (expenditure, \$) of major activities at Blue Dog Lake State Fish Hatchery (January 1 – December 31, 2005).

Category	Effort		Expenditure (\$)
	Hours	Percent	
Culture	2,660	20.5	54,466
Natural rearing ponds	248	1.9	5,048
Stocking	532	4.1	10,893
Equipment, buildings and grounds	3,250	25.0	66,422
Information and Education	170	1.3	3,454
Office	2,947	22.7	60,311
Net building and regional assistance	1,803	13.9	36,932
Holidays and leave	1,374	10.6	28,163
Fleet and Travel	---	---	20,961
Utilities	---	---	52,609
Miscellaneous <sup>1</sup>	---	---	40,756
Total	12,984	100.0	380,015

<sup>1</sup> Includes contractual services, supplies, materials, and capital assets.



Table 18. Fish production expenditure for Blue Dog Lake State Fish Hatchery and natural rearing ponds (January 1 – December 31, 2005).

Species	Size	Number	Expenditure (\$)	
			Per 1000	Total
Blue Dog Lake State Fish Hatchery				
Rainbow trout	Catchable	2,650	5,042.64	13,363
Largemouth bass	Fingerling	181,135	415.27	91,553
Smallmouth bass	Fingerling	82,670	337.84	36,354
Walleye	Fry	47,600,000	5.04	240,253
Walleye	Fingerling	1,877,600	50.39	94,628
Muskellunge	Fingerling	1,708	---	12,297
Muskellunge	Fingerling	---	---	15,006
Overall		---	---	503,454
Natural Rearing Ponds				
Walleye	Fingerling	278,040	68.82	19,131
Total		---	---	522,585

## **Notes, Information and Issues**

### *Employment*

- 1) The hatchery biologist position became vacant in June and remains vacant as of December 31.
- 2) Seasonal employment included: fish hatchery intern, 2; fisheries aide, 2; interpretive intern, 1

### *On-site Housing*

- 1) Residence-1. No information reported.
- 2) Residence-2. Remains vacant however, residence was occupied from May – August by two interns employed by BDH and Region IV Fisheries.
- 3) Residence-3. No information reported.
- 4) Residence-4. Two Region IV Fisheries interns occupied this residence (May-August).

### *Hatchery Building Maintenance*

- 1) No information reported however, construction projects beginning in 2006 will hopefully provide beneficial building improvements.

### *Electrical Related Maintenance*

- 1) The emergency generator provided 259 hours of back-up electricity due to power failures and monthly testing (210 hours of yearly total was due to a major outage caused by a severe ice storm/blizzard beginning Nov. 28).

### *Water Supply Maintenance*

- 1) Water supply line pond 10 lower end needs repair, hatchery renovation project may provide solution.
- 2) Valve on pond 8 upper end needs repair, hatchery renovation project may provide solution.
- 3) Water supply line pond 18 required maintenance. A stainless steel repair clamp was installed.

### *Miscellaneous*

- 1) Consultation with the *Fish Pro* engineering firm continued. Several needs and cost estimates for infrastructure improvements were addressed. Prioritizing of projects has been completed. Legislative approval for the bonding of funds occurred during 2005 session. Construction drawings are nearing completion. Projected timeline for actual construction for some projects is summer 2006.

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